IN THE CLAIMS:

Please cancel claims 52-59 without prejudice and amend the claims as follows:

1. (Currently Amended) In a plasma reactor for processing a ~~semiconductor wafer~~ substrate, the reactor having a ~~wafer~~ substrate processing chamber containing a ~~wafer~~ substrate support pedestal and having at least one RF power applicator capable of coupling RF power into the substrate processing chamber and a vacuum pump coupled to a pumping port of the substrate processing chamber, the reactor tending to accumulate on its interior surfaces a residue formed from process gases introduced into the ~~wafer~~ substrate processing chamber, a method for removing said residue from said interior surfaces comprising:

ionizing a gas compound of an electro-negative etch species in a secondary plasma chamber to produce an atomically free form of said etch species;

passing from said secondary plasma chamber into said ~~wafer~~ substrate processing chamber at least one of: (a) said atomically free form of said etch species, and (b) molecules of said etch species formed by recombination of said atomically free form of said etch species;

producing free electrons in said ~~wafer~~ substrate processing chamber so as to convert said molecules of said etch species into ions of said etch species by electron attachment.

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2. (Currently Amended) The method of Claim 1 wherein the producing free electrons in said ~~wafer~~ substrate processing chamber comprises introducing into said ~~wafer~~ substrate processing chamber an electron donor gas and ionizing said electron donor gas by coupling of RF power into said ~~wafer~~ substrate processing chamber by at least the one RF power applicator.

3. (Previously Presented) The method of Claim 2 wherein the ionizing said electron donor gas produces at least nearly an order of magnitude less ionization energy than the ionizing said gas compound of the etch species.

4. (Original) The method of Claim 3 wherein said electro-negative etch species comprises a member of the halogen chemical group and said electron donor gas comprises one of the inert gases.

5. (Original) The method of Claim 4 wherein said member of the halogen group comprise fluorine.

6. (Original) The method of Claim 4 wherein said one inert gas comprises helium.

7. (Currently Amended) The method of Claim 1 wherein the passing comprises maintaining said secondary plasma chamber next to said ~~wafer~~ substrate processing chamber and passing said etch species through a single passageway between the chambers so as to minimize loss of said atomically free form of said etch species by recombination.

8. (Currently Amended) The method of Claim 1 wherein the passing comprises feeding said etch species from said secondary chamber through at least one injection element facing into said ~~wafer~~ substrate processing chamber.

9. (Original) The method of Claim 8 further comprising feeding said etch species to said plural injection elements through a gas manifold.

10. (Currently Amended) The method of Claim 9 further comprising feeding said etch species through an elongate feed tube connected between said secondary plasma chamber and said ~~wafer~~ substrate processing chamber while maintaining said secondary plasma chamber and said ~~primary~~ substrate processing chamber at a separation distance corresponding to said elongate feed tube.

11. (Currently Amended) The method of Claim 10 wherein at least most or all of the free atomic form of said etch species recombines into molecules of said etch species prior to injection into said ~~wafer~~ substrate processing chamber.

12. (Currently Amended) The method of Claim 1 wherein the feeding said etch species through plural injection elements causes said etch species to be injected into said substrate processing chamber in a direction away from said vacuum pumping port, whereby to increase residency time of said etch species in said ~~wafer~~ substrate processing chamber.

13. (Currently Amended) The method of Claim 1 wherein the passing comprises injecting said etch species into said ~~wafer~~ substrate processing chamber in a direction away from said pumping port.

14. (Currently Amended) The method of Claim 13 wherein the injecting comprises injecting said etch species in a direction generally parallel to and adjacent an interior surface of said substrate processing chamber.

15. (Currently Amended) The method of Claim 14 wherein said interior surface is a side wall of said ~~wafer~~ substrate processing chamber and said pumping port is near a floor of the ~~wafer~~ substrate processing chamber, and wherein the injecting comprises injecting the etch species at entry points next to said side wall and in a direction away from said floor and toward said ceiling.

16. (Previously Presented) The method of Claim 15 wherein the injecting comprises injecting said etch species near the floor and in a direction away from the floor.

17. (Currently Amended) The method of Claim 1 wherein the passing comprises injecting the etch species into the ~~wafer~~ substrate processing chamber near the pumping port and in a direction away from the pumping port.

18. (Currently Amended) The method of Claim 2 wherein said substrate processing chamber further comprises plural RF power applicators comprising electrodes and coil antennas comprised within or adjacent walls of said substrate processing chamber, and wherein the coupling RF power into the ~~wafer~~ substrate processing chamber comprises connecting at least one of said RF power applicators to an RF power source and connecting others of said RF power applicators to an RF return potential.

19. (Original) The method of Claim 18 further comprising connecting further ones of said RF power applicators to a floating potential.

20. (Currently Amended) A method of cleaning interior surfaces of a ~~wafer~~ substrate processing chamber comprising:

ionizing in a secondary plasma chamber a stable gas compound of an electronegative etch species to produce plasma products, said plasma products including molecules of said etch species formed by recombination of ions of said etch species;

supplying said plasma products into said ~~wafer~~ substrate processing chamber;

ionizing by electron attachment in said ~~wafer~~ substrate processing chamber the molecules of said electronegative etch species by introducing an electron donor gas into said ~~wafer~~ substrate processing chamber and ionizing said electron donor gas to produce free electrons.

21. (Original) The method of Claim 20 wherein said etch species comprises a halogen element.

22. (Original) The method of Claim 21 wherein said stable gas compound comprises a compound of said halogen element and a non-metal element.

23. (Original) The method of Claim 21 wherein said stable gas compound comprises NF3.

24. (Original) The method of Claim 21 wherein said electron donor gas comprises an inert gas.

25. (Original) The method of Claim 24 wherein said inert gas comprises helium.

26. (Currently Amended) The method of Claim 20 wherein the supplying said plasma products into said ~~wafer~~ substrate processing chamber comprises introducing said plasma products through a single port between said secondary plasma chamber and said ~~wafer~~ substrate processing chamber.

27. (Currently Amended) The method of Claim 20 wherein the supplying said plasma products into said ~~wafer~~ substrate processing chamber comprises initially confining said products to an annular zone contiguous with a side wall of said substrate processing chamber.

28. (Previously Presented) The method of Claim 27 wherein the initially confining said products comprises channeling said products to at least one injection nozzle adjacent said side wall.

29. (Currently Amended) The method of Claim 20 wherein the supplying said plasma products into said ~~wafer~~ substrate processing chamber comprises injecting said products into an annular zone contiguous with a side wall of said substrate processing chamber in a direction parallel with said side wall.

30. (Currently Amended) The method of Claim 29 wherein the injecting said products comprises feeding said products to plural gas injection passages facing into said ~~wafer~~ substrate processing chamber located within a thin annular zone contiguous

with said side wall and pointing in a gas injection direction at least nearly parallel with said side wall.

31. (Currently Amended) The method of Claim 29 wherein said ~~wafer~~ substrate processing chamber has a pumping port coupled to a vacuum pump corresponding to a gas evacuation direction toward said pumping port, and wherein said gas injection direction of the injecting is generally opposite to said gas evacuation direction.

32. (Currently Amended) The method of Claim 31 wherein the injecting said products comprises feeding said products to plural gas injection passages facing into said ~~wafer~~ substrate processing chamber located within a thin annular zone contiguous with said side wall and pointing in a gas injection direction at least nearly parallel with said side wall and generally opposite to said gas evacuation direction.

33. (Currently Amended) In a ~~wafer~~ substrate processing chamber tending to accumulate contaminant deposits on its interior surfaces during ~~wafer~~ substrate processing, a method of removing said deposits comprising:

furnishing into said substrate processing chamber products produced in an external source by ionizing a stable gas compound of an electronegative etch species;

ionizing molecules of said electronegative etch species by electron attachment in said ~~plasma~~ substrate processing chamber.

34. (Currently Amended) The method of Claim 33 wherein the ionizing said molecules of said electronegative etch species comprises introducing an electron donor gas into said ~~wafer~~ substrate processing chamber and ionizing said electron donor gas to produce free electrons.

35. (Original) The method of Claim 33 wherein said etch species comprises a halogen element.

36. (Original) The method of Claim 21 wherein said stable gas compound comprises a compound of said halogen element and a non-metal element.

37. (Original) The method of Claim 34 wherein said electron donor gas comprises an inert gas.

38. (Currently Amended) The method of Claim 33 wherein the furnishing the products into said ~~wafer~~ substrate processing chamber comprises introducing said products through a single port between said external source and said ~~wafer~~ substrate processing chamber.

39. (Currently Amended) The method of Claim 33 wherein the furnishing said products into said ~~wafer~~ substrate processing chamber comprises initially confining said products to an annular zone contiguous with a side wall of said substrate processing chamber.

40. (Previously Presented) The method of Claim 39 wherein the initially confining said products comprises channeling said products to plural injection nozzles adjacent said side wall.

41. (Currently Amended) The method of Claim 33 wherein the furnishing said plasma products into said ~~wafer~~ substrate processing chamber comprises injecting said products into an annular zone contiguous with a side wall of said substrate processing chamber in a direction parallel with said side wall.

42. (Currently Amended) The method of Claim 41 wherein the injecting said products comprises feeding said products to plural gas injection passages facing into said ~~wafer~~ substrate processing chamber located within a thin annular zone contiguous with said side wall and pointing in a gas injection direction at least nearly parallel with said side wall.

43. (Currently Amended) The method of Claim 42 wherein said ~~wafer~~ substrate processing chamber has a pumping port coupled to a vacuum pump corresponding to a gas evacuation direction toward said pumping port, and wherein said gas injection direction of the injecting is generally opposite to said gas evacuation direction.

44. (Currently Amended) The method of Claim 43 wherein the injecting said products comprises feeding said products to plural gas injection passages facing into said ~~wafer~~ substrate processing chamber located within a thin annular zone contiguous with said side wall and pointing in a gas injection direction at least nearly parallel with said side wall and generally opposite to said gas evacuation direction.

45. (Currently Amended) The method of Claim 34 wherein the introducing an electron donor gas comprises injecting said electron donor gas through gas passages in a ~~wafer~~ substrate support pedestal of said ~~wafer~~ substrate processing chamber.

46. (Currently Amended) The method of Claim 34 wherein the introducing an electron donor gas comprises injecting said electron donor gas through gas injection elements facing into said ~~wafer~~ substrate processing chamber.

47. (Currently Amended) The method of Claim 33 wherein the furnishing the products into the ~~wafer~~ substrate processing chamber comprises furnishing primarily molecules of said etch species formed by recombination of ions of said etch species.

48. (Previously Presented) The method of Claim 33 wherein the ionizing said electron donor gas comprises applying an amount of RF power that is insufficient to achieve a kinetic ionization of said gas molecules of said etch species.

49. (Previously Presented) The method of Claim 48 wherein the ionizing said electron donor gas comprises applying an amount of RF power that is several time less than that required to ionize said gas compound of said electronegative etch species.

50. (Currently Amended) The method of Claim 34 wherein said ~~wafer~~ substrate processing chamber comprises RF power applicator apparatus and wherein the ionizing an electron donor gas comprises applying RF power to said RF power applicator apparatus.

51. (Currently Amended) The method of Claim 50 wherein said RF power applicator apparatus comprises plural RF power applicators at respect locations about said ~~wafer~~ substrate processing chamber, and wherein the ionizing an electron donor gas comprises enhancing concentration of ions of said etch species near a selected area of an enclosure wall of said ~~wafer~~ substrate processing chamber by applying RF power across two of said RF power applicators while permitting others of said RF power applicators to float electrically, one of said two RF power applicators being adjacent said selected area.

52-59. (Canceled)

60. (New) The method of Claim 5 wherein said member of the halogen group is NF_3.

61. (New) The method of Claim 33 wherein the stable gas compound is NF_3.

62. (New) The method of Claim 1 wherein the molecules of said etch species is fluorine gas.

63. (New) The method of Claim 20 wherein the molecules of said etch species is fluorine gas.

64. (New) The method of Claim 33 wherein the molecules of said electronegative etch species is fluorine gas.